

The Lingual Pearl

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The maturation of deglutition starts early in a child's life and sometimes ends only with the eruption of the permanent dentition. Bilabial contact is important during both rest and deglutition in maintaining equilibrium.

An abnormal chewing/deglutition function can be caused by a multitude of problems, including excessive overjet, muscular atonicity, sucking habits, and night-time ventral position. When the tongue doesn't work over the maxillary dental arch, the lack of stimulus to the intermaxillary suture can have an adverse effect on transverse development and lead to the development of crossbite. The low and protrusive position of the tongue further complicates the situation for the orthodontist.

Of course, any kind of functional imbalance can interfere with normal development. Since all orofacial functions can be trained—including deglutition, chewing, breathing, and phonation—an understanding of the growth process is important for both the orthodontist and the speech therapist. With a multidisciplinary approach, the causes of dysfunction can be attacked, rather than the effects.

Many devices have been designed to influence growth through early rehabilitation of lingual function. Among those that elevate the tongue against the palate are the Lingual Pearl, the tongue lifter, and the night-time tongue enve-lope.^{1,2}

The Lingual Pearl

The Lingual Pearl is a passive guidance appliance that can be used either as an adjunct to orthodontic therapy or as the main appliance for lingual retraining. It can be prescribed at any time during treatment or even in retention, and can be constructed in many different forms—removable, fixed, and Essix-type (Fig. 1).

For the pearl to work correctly, the following three factors must be considered in its construction:

- 1. The size of the pearl is of primary importance. In most of the appliances available on the market, the pearl is too big or located too far back in the mouth. Since a lingual roller can be added to prevent the tongue from extending between the teeth and the lips and to correct lingual function (Fig. 2), the pearl itself should be only a small reference marker. This will leave room for lingual exercises, with the capability of contact between the tongue and the palatal mucus.
- 2. Rotational and sliding movements of the pearl are necessary for various lingual exercises.
- 3. The particular exercises used depend on whether they are for deglutition training or for speech therapy. In either case, it is important to establish an initial contact with the appliance for about three weeks. During this phase, the patient wears only the pearl, and rotational and lateral sliding exercises are prescribed several times a day to increase muscular elasticity. We ask the patient to post a "Lingual Pearl" reminder in a prominent place at home as a visual aid.

Later, if it is a case of deglutition training, the tip of the tongue should rest on the pearl while deglutition is performed with the teeth closed and the lips together. The patient must be instructed to exert only light pressure on the pearl to avoid protrusion of the incisors.

Phonation training should be carried out by a speech therapist. The orthodontist should merely inform the therapist of the advantages and applications of the appliance.

Applications

The Lingual Pearl can be used alone only when the tongue is the principal etiological factor responsible for the malocclusion. Retraining more complex muscular movements is a difficult task that requires almost daily monitoring of the patient, which is virtually impossible to achieve in an orthodontic practice.

In most cases, the tongue will adapt to the new position of the dentition. However, to control the muscular forces of the tongue during space closing or bite opening, the Lingual Pearl can be attached to a transpalatal bar or a quad-helix (Fig. 3).

A Lingual Pearl can be used in the final phase of treatment of an open-bite case where vertical elastics were used to close the bite. Lingual retraining will help prevent reopening of spaces and subsequent relapse. When used during finishing, the pearl can be bonded to the palatal sides of the premolars and remain there until tongue movement has been normalized.

A surgical patient is also a good candidate for the pearl, given the abrupt change in the amount of space available for the tongue – especially in an open-bite case.

Case 1

A 9-year-old male presented with a Class I occlusion, an anterior open bite, and a unilateral posterior crossbite (Fig. 4A). The patient had a fingersucking habit and a persistent infantile deglutition.

A rapid maxillary expander was bonded. Because there was no risk of creating a gummy smile, anterior vertical elastics were used to close the bite (Fig. 4B). This procedure has a tendency to relapse, especially in patients with sucking habits. Therefore, after five months of treatment, the expander was removed and a Lingual Pearl was placed to control the habit and the tongue position (Fig. 4C).

A month later, the fixed appliances were removed (Fig. 4D). The pearl was kept for another four months of retention.

Case 2

An 18-year-old female presented with a severe skeletal Class II malocclusion, with a 14° ANB angle, 17mm overjet, 12mm anterior open bite, and 6.5mm and 2.5mm of crowding in the maxillary and mandibular dental arches, respectively (Fig. 5A). She displayed abnormal deglutition and a severe gummy smile resulting from vertical excess and incisor protrusion.

The four first premolars were extracted to allow the coordination of well-aligned, level, and matching dental arches prior to LeFort I and Obwegeser Dalpont mandibular advancement surgery (sagittal split). The surgery retruded the maxilla about 8mm and advanced the mandible 11mm.

After surgery, minor adjustments were made with intermaxillary elastics. Because the original deformity was pronounced and postsurgical difficulties in deglutition were evident, a Lingual Pearl

was added after 22 months to help retrain the tongue. A speech therapist also played an important role in this case.

Fixed appliances were removed five months later (Fig. 5B), and the pearl was used for another six months of retention.

Case 3

An 11-year-old female presented with a Class II malocclusion, anterior open bite, infantile deglutition, and predominantly oral breathing (Fig. 6A).

The patient's tonsils and adenoids had been removed, but her breathing and deglutition patterns persisted. Therefore, a Lingual Pearl was prescribed along with breathing exercises four months before orthodontic treatment was begun. A maxillary expander and fixed appliances with Class II elastics were then placed.

Fixed appliances were removed after 20 months (Fig. 6B); the Lingual Pearl was maintained for another year after treatment.

Case 4

A 14-year-old female presented with a Class III dolichofacial pattern, with an ANB angle of 0° , facial axis of 84° , lower facial height of 56° , overjet of 0mm, and infantile deglutition (Fig. 7A).

In a Class III case such as this, low tongue posture is commonly related to a wide mandibular arch. However, contraction of the mandibular arch, particularly in extraction cases, can create adaptation problems. The Lingual Pearl can make a significant contribution by providing a reference to the new tongue position.

The maxillary left second bicuspid and right first bicuspid and both mandibular first bicuspid were extracted. Leveling was carried out with Class III elastics, and inverted brackets (22° torque) were used on the maxillary incisors (Fig. 7B).

After 18 months, a Lingual Pearl was added. Six months later, the fixed appliances were removed (Fig. 7C). □

FIGURES



Fig. 1 A. Lingual Pearl on transpalatal arch bonded to premolars. B. Lingual Pearl added to Essix

splint.



Fig. 2 Lingual roller used to prevent extension of tongue between teeth and lips.

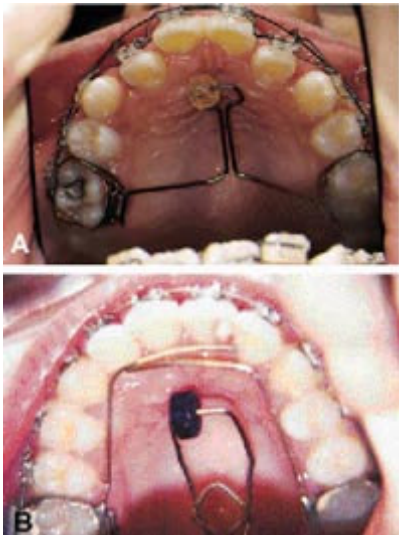


Fig. 3 A. Lingual Pearl on transpalatal bar. B. Lingual Pearl on quad-helix.

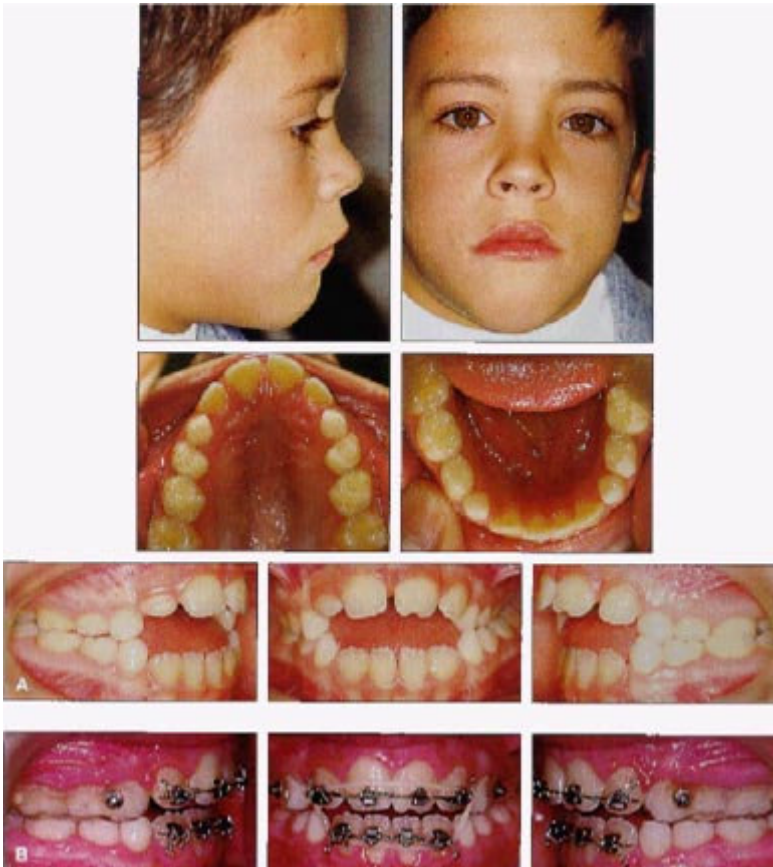


Fig. 4AB Case 1. A. 9-year-old male with anterior open bite before treatment. B. Rapid palatal expander and vertical elastics.

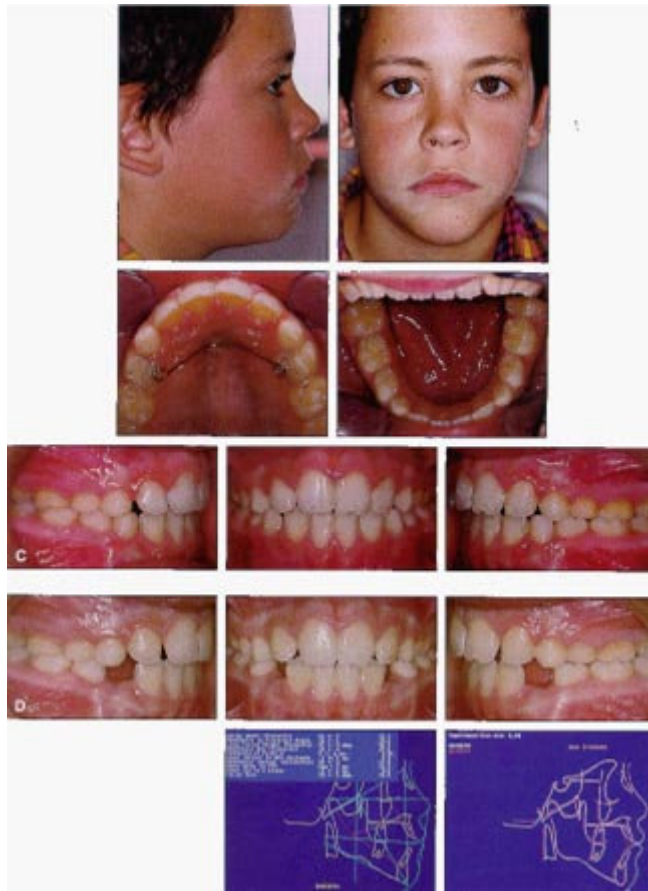


Fig. 4CD C. After six months of treatment, with Lingual Pearl added one month before removal of fixed appliances and kept for retention. D. One year after treatment.



Fig. 5A Case 2. A. 18-year-old female with severe skeletal Class II malocclusion.

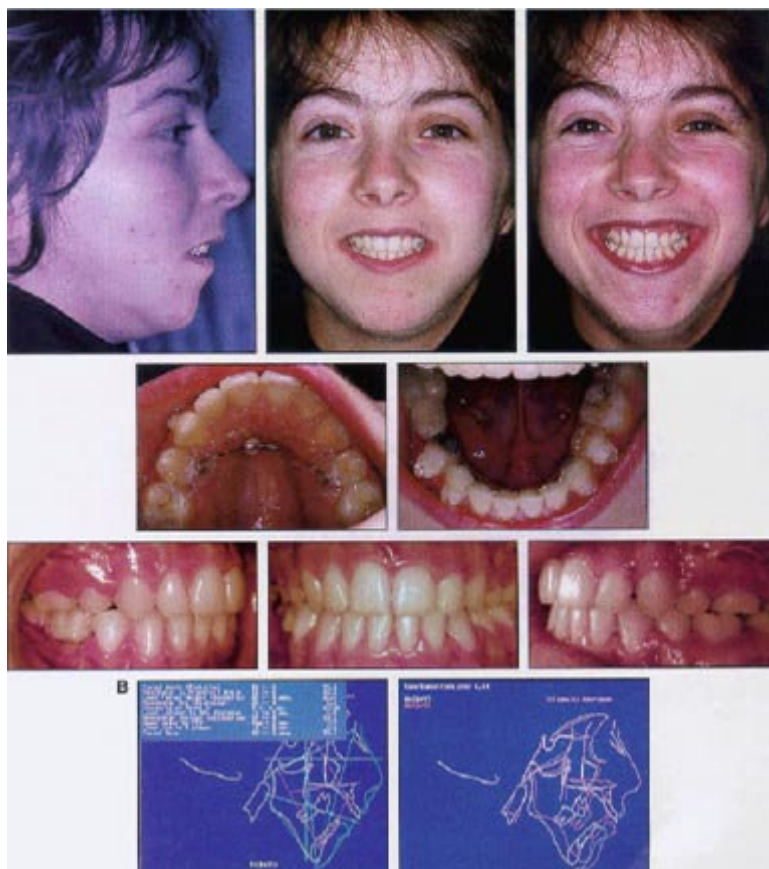


Fig. 5B Case 2. B. After sagittal split surgery and 27 months of orthodontic treatment, with Lingual Pearl added five months before removal of appliances.



Fig. 6A Case 3. A. 11-year-old female Class II patient with anterior open bite and abnormal deglutition.

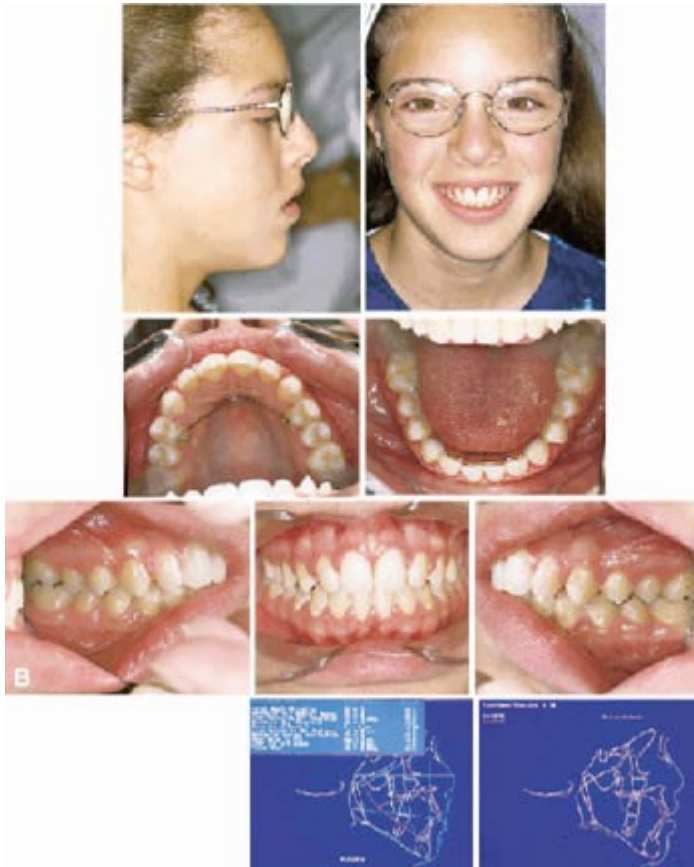


Fig. 6B Case 3. B. After four months of breathing exercises with Lingual Pearl and 20 months of treatment with maxillary expander and Class II elastics, with pearl maintained until one year after treatment.

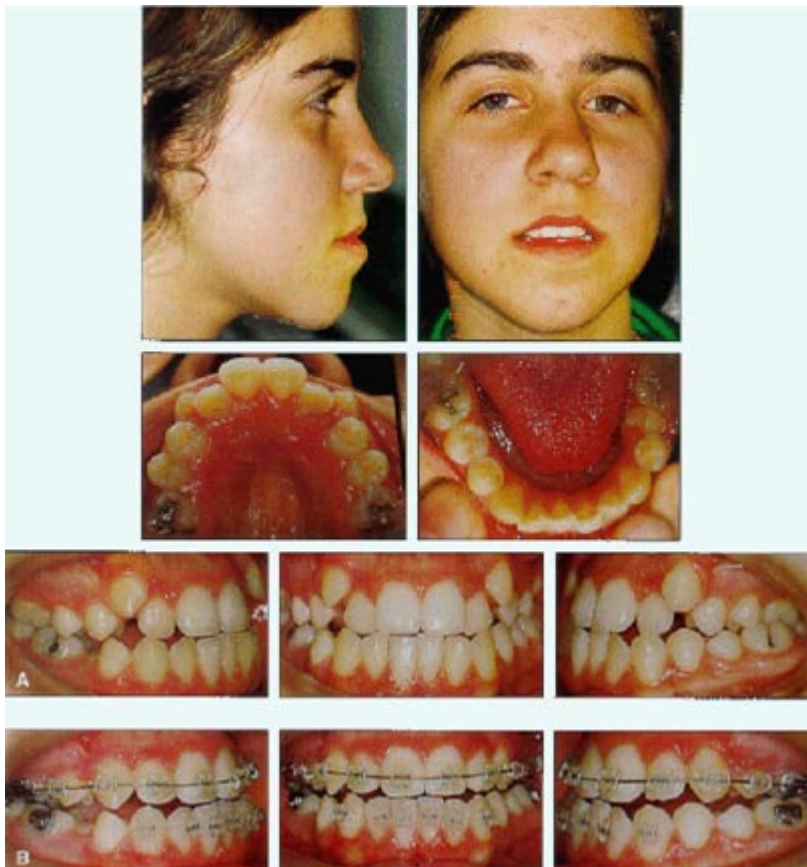


Fig. 7AB Case 4. A. 14-year-old female with Class III dolichofacial pattern. B. Fixed appliances in place after extractions, showing complete open bite.

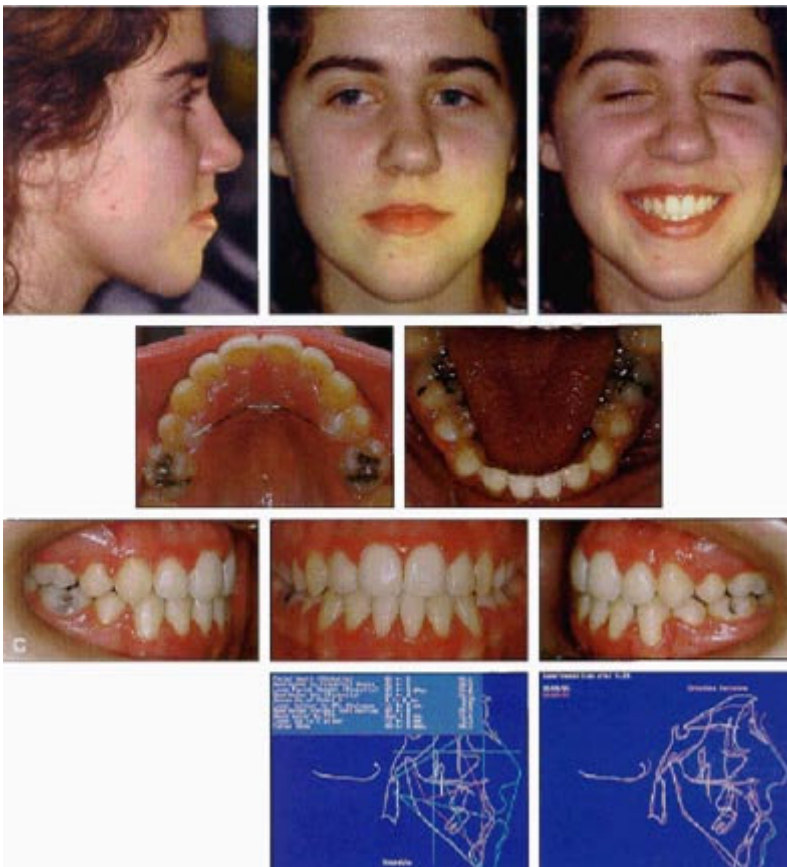


Fig. 7C Case 4. C. After 24 months of treatment, with Lingual Pearl added six months before removal of fixed appliances.

REFERENCES

- 1 Amoric, M.: Gouitières a écrans linguax, Rev. Orthop. Dentofac. 27:239-240, 1993.
- 2 Bonnet, B.: Un appareil de reposturation: l'Enveloppe Linguale Nocturne (ELN), Rev. Orthop. Dentofac. 26:329-347, 1992.

FOOTNOTES

- 1 Raintree Essix, Inc., 1069 S. Jeff Davis Parkway, New Orleans, LA 70125.
- 2 Bluegrass roller, TP Orthodontics, Inc., 100 Center Plaza, LaPorte, IN 46350.]